netsys

Networking your world

NH-310C

HPNA3.1 Ethernet over Coaxial Cable (HCNA) End Point

USER'S MANUAL

Http://www.netsys.com.tw

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Maximum signal rate derived from IEEE Standard specifications. Actual data throughput will vary. Network conditions and environmental factors, including volume of network traffic, building materials and construction, and network overhead, lower actual data throughput rate. Netsys does not warrant that the hardware will work properly in all environments and applications, and makes no warranty and representation, either implied or expressed, with respect to the quality, performance, merchantability, or fitness for a particular purpose. Make sure you follow in line with the environmental conditions to use this product.

Foreword

Attention:

Be sure to read this manual carefully before using this product. Especially Legal Disclaimer, Statement of Conditions and Safety Warnings.

Netsys' NH-310C is the latest technological innovation of HomePNA3.1 Ethernet over coaxial cable end point. NH-310C is designed for home and office applications that leverage the two most popular network connections for home use: 10/100Mbps Ethernet connection and coaxial cable connection.

It is a norm that homes and offices are equipped with wired network that simply transfer small files and shared applications, but the need for triple play services like transferring large multimedia files such as music, video, photo and deliver high speed VOIP data are ever increasing.

This is why NH-310C is designed to be a cost effective home networking solution. With the data transmission up to 200Mbps and distance can withstand 60dB of the attenuation; it meets the growing demand for high speed multimedia services. With plug & play, this simply eliminates the pain in modification and high infrastructure cost. Most importantly, to be able to support point-to-point and point-to-multipoint applications allow networking for any locations such as home, office, sports center, buildings, apartments, hotels, resorts and other places that need a high bandwidth network.

Caution:

The NH-310C is for **indoor** applications only. This product does not have waterproof protection. Do not use in harsh environments (Over temperature range: 0°C ~ 50°C (32°F ~ 122°F)).

Safety Warnings

For your safety, be sure to read and follow all warning notices and instructions before using the device.

- **DO NOT** open the device or unit. Opening or removing covers can expose you to dangerous high voltage points or other risks. ONLY qualified service personnel can service the device. Please contact your vendor for further information.
- **Use ONLY** the dedicated power supply for your device. Connect the power to the right supply voltage (110V AC used for North America and 230V AC used for Europe).
- **Place** connecting cables carefully so that no one will step on them or stumble over them. DO NOT allow anything to rest on the power cord and do NOT locate the product where anyone can work on the power cord.
- **DO NOT** install nor use your device during a thunderstorm. There may be a remote risk of electric shock from lightning.
- **DO NOT** expose your device to dampness, dust or corrosive liquids.
- **DO NOT** use this product near water, for example, in a wet basement or near a swimming pool.
- **Connect ONLY** suitable accessories to the device.
- **Make sure** to connect the cables to the correct ports.
- **DO NOT** obstruct the device ventilation slots, as insufficient air flow may harm your device.
- **DO NOT** place items on the device.
- **DO NOT** use the device for outdoor applications directly, and make sure all the connections are indoors or have waterproof protection place.
- **Be careful** when unplugging the power, because it may produce sparks.
- **Keep** the device and all its parts and accessories out of the reach of children.
- **Clean** the device using a soft and dry cloth rather than liquid or atomizers. Power off the equipment before cleaning it.
- This product is **recyclable**. Dispose of it properly.

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Chapter 1. Unpacking Information

1.1Check List

Carefully unpack the package and check its contents against the checklist.

Package Contents

- 1 x HCNA Modem
- 1 x AC to DC **5V or 12V** / 1A Power Adapter
- 4 x Rubber Feet
- 1 x RJ-45 Cable

Notes:

1. Please inform your dealer immediately for any missing or damaged parts. If possible, retain the carton including the original packing materials. Use them to repack the unit in case there is a need to return for repair.
2. If the product has any issue, please contact your local vendor.
3. Do not use sub-standard power supply. Before connecting the power supply to the device, be sure to check compliance with the specifications. The NH-310C supports 5V to 12 VDC power input.
4. The power supply included in the package is commercial-grade. Do not use in industrial-grade applications.
5. Please look for the QR code on the bottom of the product, the user can launch the QR code scanning program to scan and download the user's manual electronic format file.

Chapter 2. Hardware Description

This section describes the important parts of the modem. It features the front indicators and rear connectors.

NH-310C Outward

2.1 Front Panel

The front panel provides a simple interface monitoring of the end point. (Figure 2.1)

Figure 2.1: NH-310C Front Panel

2.2 LED indicators

At a quick glance of the front panel, it will be easy to tell if the modem has power, signal from its 2 Ethernet RJ-45 port, its HCNA coaxial connector and high / low line speed quality.

Front Indicators

The end point has **Six** LED indicators. The following Table shows the description. (Table 2-1)

Table 2-1: LED Indicators Description and Operation

LEDs	Color	Status	Descriptions
Power	Green	On	HCNA system power good and also functioning properly.
		Off	HCNA is not ready or has malfunctioned.
LAN1 & LAN2 (Ethernet LED)	Green	On	Ethernet link is up.
		Blinking	Transmit or receive activity.
		Off	Ethernet link is down.
HCNA (HCNA LED)	Green	On	HCNA is link to another HCNA pair.
		Blinking	Transmit or receive activity.
		Off	HCNA is not connected.
Line Speed (HCNA LED)	Green	On	Actual line rate is **> 80Mbps** for upstream and downstream line rate.
	Green Yellow	On	Actual line rate is **64Mbps** ≦ **X** ≧ **32Mbps** for upstream and downstream line rate.
	Yellow	On	Actual line rate is **< 32Mbps** for upstream and downstream line rate.

Table 2-2 Line Speed performance with reference to Line speed LED

Dataspeed (Mbps)	Attenuator (dB)	SNR (dB)	Line speed LED on	
80 or above	40 and below	28	Green	
64	42 to 48	27	Yellow	Green
48	42 to 48	25	Yellow	Green
32	42 to 48	23	Yellow	Green
32 or below	50 and above	22	Yellow	

2.3 Rear Panel

The rear panel provides the physical connectors connected to the power adapter and any other network device. The following figure shows the rear side of the Modem. (Figure 2.2)

Figure 2.2: Rear side of the Modem

And the table shows the description. (Table 2-3)

Table 2-3: Connectors shown on the rear side of the Modem

Connectors	Type	Description
HCNA	F-type female coaxial cable	For connecting the 2 HCNA modems with **RG59 75ohm** coaxial cable.
TV	F-type female coaxial cable	For connecting to TV or STB.
LAN1/LAN2	RJ-45	For connecting to an Ethernet equipped device.
Power	Power Jack	For connecting to **5-12VDC / 1A** power adapter, regarding the NH-310C power specification you can refer to serial sticker of the bottom.

Chapter 3. Installation

3.1 Hardware Installation

This chapter describes how to install the modem and establish the network connections. You may install the modem on any level surface (ex. a table or shelf). However, please take note of the following minimum site requirements before you begin. **NH-310C needs paste four rubber feet on the bottom to avoid scratching, please refer to Appendix E: Attaching Rubber Feet.**

3.2 Pre-installation Requirements

Before the start of actual hardware installation, make sure to provide the right operating environment, including power requirements, sufficient physical space, and proximity to other network devices that are to be connected. Verify the following installation requirement:

- Power requirements: **5-12VDC / (1A or above)**
- The device should be located in a **cool dry place**, with at least **10cm / 4in** of space at the front and back for ventilation.
- Place the device away from **direct sunlight**, **heat sources**, or areas with a high amount of electromagnetic interference.
- Check if network cables and connectors needed for installation are available.
- Avoid installing this device with radio amplifying station nearby or transformer station nearby.

3.3 General Rules

Before making any connections to the modem, take note the following rules:

- **Ethernet Port (RJ-45)**
  All network connections to the end point Ethernet ports must be made using Category 5 UTP or above for 100 Mbps, Category 3, 4 UTP for 10Mbps.
  No more than 100 meters of cabling maybe use between the MUX or HUB and an end node.
- **HCNA Port (Coaxial connector)**
  All Home network connections we recommend use RG-59 75Ω coaxial cable and link establish under -160dBm/Hz noise floor.
- **Multi-Splitter**
  All Home network connections could be use Multi-Splitter or use mix of them as you would like to connect an end point device.

Multi-Splitter

3.4 HCNA Connections

The modem has been designed to operate on the coaxial cable installed in homes throughout the world. They utilized the same cable and connectors commonly used for television.

The modem has 2 x Ethernet ports. One port is used to connect to the ISP to provide Internet access and the other port is used to connect devices such as HUB, concentrator, bridge or router. The device attached to these ports must support auto-negotiation.

The 2x Coaxial connector are used to connect to TV or coaxial wall socket to another modem that connect its RJ-45 to the LAN card of another set of PC, notebook, or other internet access device or coaxial connector to TV or set top box.
The modem's coaxial connector must support the transmission of data up to 200Mbps across the existing coaxial cable and link establish under **-160dBm/Hz** noise floor. But make sure that the connector is inserted properly and lock.
Ethernet cable used must conform to FCC standard to ensure data integrity and it should not exceed **100meters** (328feet).
The NH-310C supports up to **10**(maximum) NH-310C Endpoints.

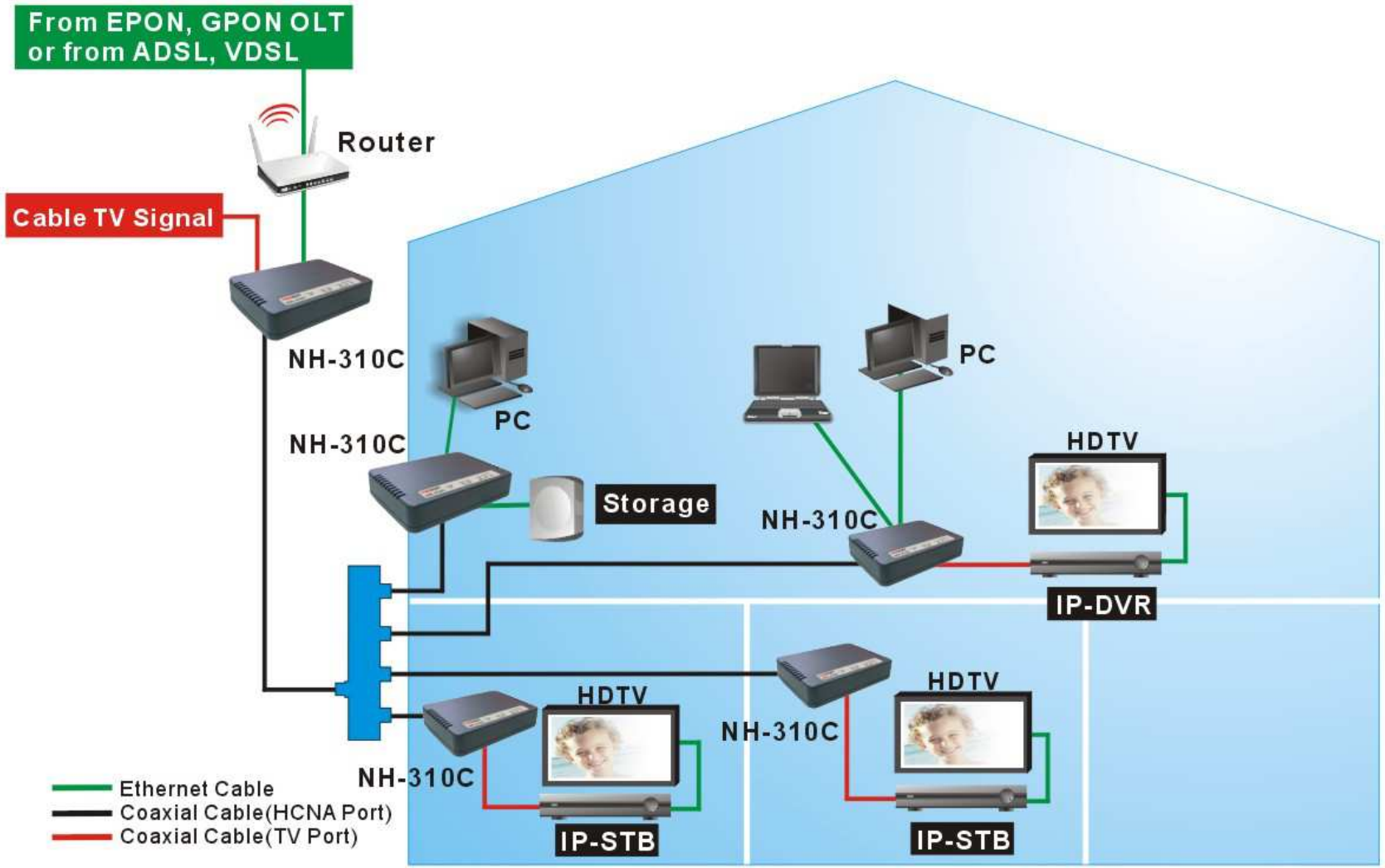


Figure 3.1: NH-310C connections diagram

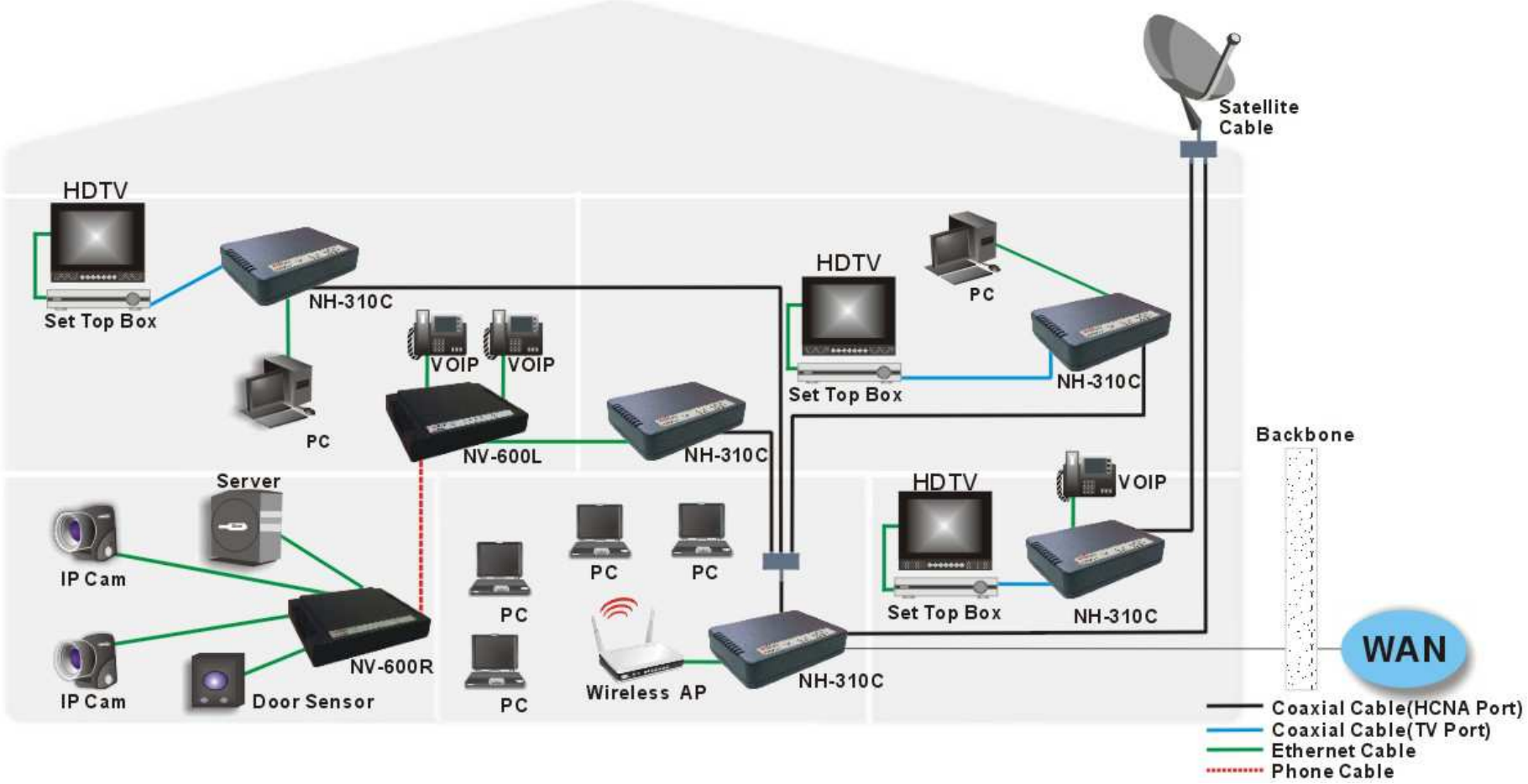


Figure 3.2: NH-310C connections diagram-2

Appendix A: Cable Requirements

A CAT 3, 4 or 5 UTP (unshielded twisted pair) cable is typically used to connect the Ethernet device to the modem. A 10Base-T cable often consists of four pairs of wires, two of which are used for transmission. The connector at the end of the 10Base-T cable is referred to as an RJ-45 connector and it consists of eight pins. The Ethernet standard uses pins 1, 2, 3 and 6 for data transmission purposes. **(Table A-1)**

Table A-1 RJ-45 Ethernet Connector Pin Assignments

PIN #	MDI		MDI-X	
	Signal	Media Dependant interface	**Signal**	Media Dependant interface-cross
1	TX+	Transmit Data +	RX+	Receive Data +
2	TX-	Transmit Data -	RX-	Receive Data -
3	RX+	Receive Data +	TX+	Transmit Data +
4	--	Unused	--	Unused
5	--	Unused	--	Unused
6	RX-	Receive Data -	TX-	Transmit Data -
7	--	Unused	--	Unused
8	--	Unused	--	Unused

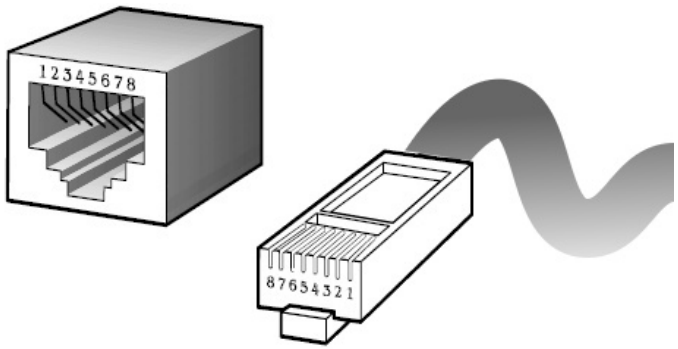


Figure A-1 Standard RJ-45 repectacle/connector

Note:

Please make sure your connected cables are with same pin assignment as above table before deploying the cables into your network.

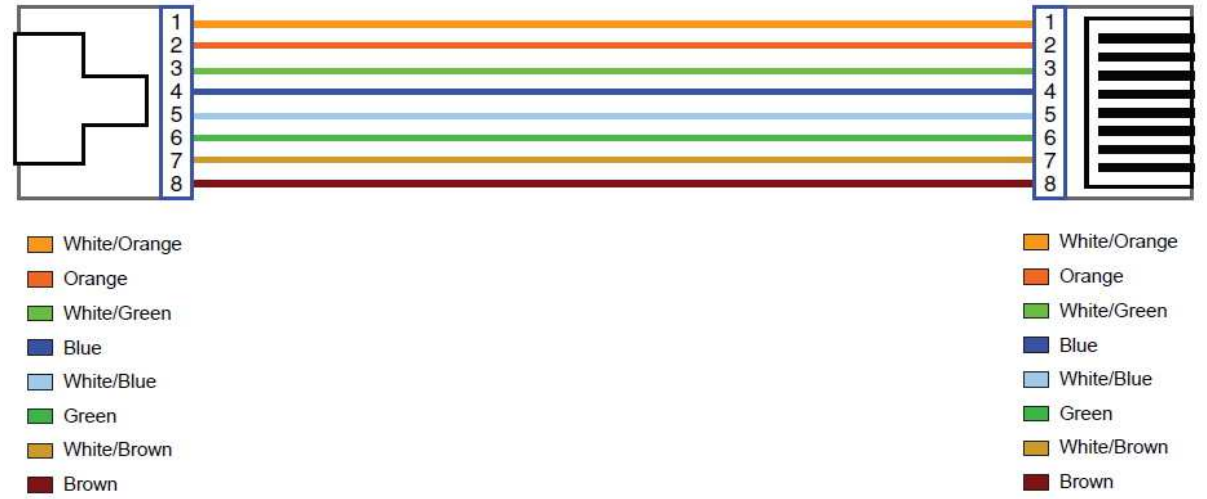


Figure A-2 Pin Assignments and Wiring for an RJ-45 Straight-Through Cable

Figure A-3 Pin Assignments and Wiring for an RJ-45 Crossover Cable

Appendix B: Product Specification

Key Features & Benefits

- Compliant with HomePNA3.1/HomePNA3.0 over coaxial cable(HCNA) specifications (ITU-T G.9954)
- Compliant with IEEE802.3 10Base-T and IEEE802.3u 100Base-Tx standards
- Compliant with IEEE802.3x flow control standard
- Provides 2 x 10/100M auto-negotiation RJ-45 Ethernet ports with auto-MDI/MDIX
- Provides 2 x f-type female coax connectors for HCNA and TV
- Supports transmission speed up to 200Mbps over coaxial cable and link establish under -160dBm/Hz noise floor
- Supports point to point and point to multipoint application
- Supports IEEE802.1p priority mapping
- Supports IEEE802.1p/TOS priority queue
- Supports IEEE802.1Q Tag VLAN pass through
- Supports auto-speed from 32Mbps up to 200Mbps(upstream + downstream)
- Supports up to 10 endpoints or slaves
- Guaranteed QoS based on HomePNA3.1 parameterized QoS
- EMI certified by CE and FCC

Product Specification

Standards:	IEEE802.3 / IEEE802.3u / ITU-T G.9954 standard
Interfaces:	2 x RJ-45, 10/100Mbps Ethernet port with Auto-MDI/MDIX 1 x F-type female coaxial connector for HCNA 1 x F-type female coaxial connector for STB/TV 1 x Power jack for 5-12VDC / 1A power adapter.
Max. Bandwidth:	Up to 200Mbps
Max. Noise Floor	-160dBm/Hz (Up to 1100m over RG-59 75ohm coaxial cable)
LED Indicators:	1 x Power LED 2 x Ethernet "Link/Activity" LEDs 1 x HCNA "Link/Activity" LED 2 x HCNA Line Speed (Quality) LED
SAT HCNA Transmission Spectrum:	12MHz ~ 44MHz
Dimensions:	130mm x 94.5mm x 27mm (5.12" x 3.72" x 1.06") (L x W x H)
Temperature:	Operating: 0ºC ~ 50ºC (32ºF ~ 122ºF) Storage: -20ºC ~ 70ºC (-4ºF ~ 158ºF)
Humidity:	10% ~ 90% non-condensing
External Power Adapter:	5VDC / 1A or 12VDC / 1A for commercial type adapter

Appendix C: Troubleshooting

Diagnosing the Modem's Indicators

The endpoint can be easily monitored through its comprehensive panel indicators. These indicators assist the network manager in identifying problems the hub may encounter. This section describes common problems you may encounter and possible solutions.

1. Symptom:	POWER indicator does not light up (green) after power on.
Cause:	Defective External power supply
Solution:	Check the power plug by plugging in another that is functioning properly. Check the power adapter with another device. If these measures fail to resolve the problem, have the unit power supply replaced by a qualified distributor.

2. Symptom:	Link indicator does not light up (green) after making a connection.
Cause:	Network interface (ex. a network adapter card on the attached device), network cable, or switch port is defective.
Solution:	2.1 Verify that the endpoint and attached device are powered on. 2.2 Make sure the cable is plugged into both modems and corresponding device. 2.3 Verify that the proper cable type is used and its length does not exceed specified limits. 2.4 Check the modem on the attached device and cable connections for possible defects. 2.5 Replace the defective modem or cable if necessary.

3. Symptom:	Line speed LEDs do not light up green only, LEDs light up both green and yellow after making a connection.
Cause:	It is a normal response of the device when it is running at 32 to 64Mbps or SNR value at 23 to 27dB.
Solution:	To increase the data speed to more than 64Mbps, so that line speed LED will light up green then you have to increase the SNR value to 28 or above. Either by decreasing the coaxial cable distance or by decreasing the number of splitters connected to the coaxial cable.

4. Symptom:	I connect TV signal to NH-310C, why TV signal can't show on TV.
Cause:	TV signal is too weak or other factors.
Solution:	Please verify that the following items to help you clarify the problem: 1. Verify coaxial cable must use RG59 75 ohm cable. 2. Verify TV signal source and TV if available. 3. Check TV signal need to over 50MHz that will be passed. 4. Add TV signal repeater if TV signal source is too weak. (See **Figure C-1**, Situation A) 5. Add attenuator before TV if TV signal is too strong. (See **Figure C-1**, Situation B)
Notes:	1. Weakened by the output television signal is due to environmental factors. NH-310C supports TV signal pass through, but can not guarantee to be able to maintain an appropriate TV signal output to TV, If the connection distance is too long lead to output of TV signal no signal or attenuation. 2. Please note that NH-310C TV signals input power is unlimited, user does not need add the attenuator before NH-310C to weaken the TV signal source. 3. If TV signal is too strong, leading to the advent of television ripple, please add an attenuator before TV.

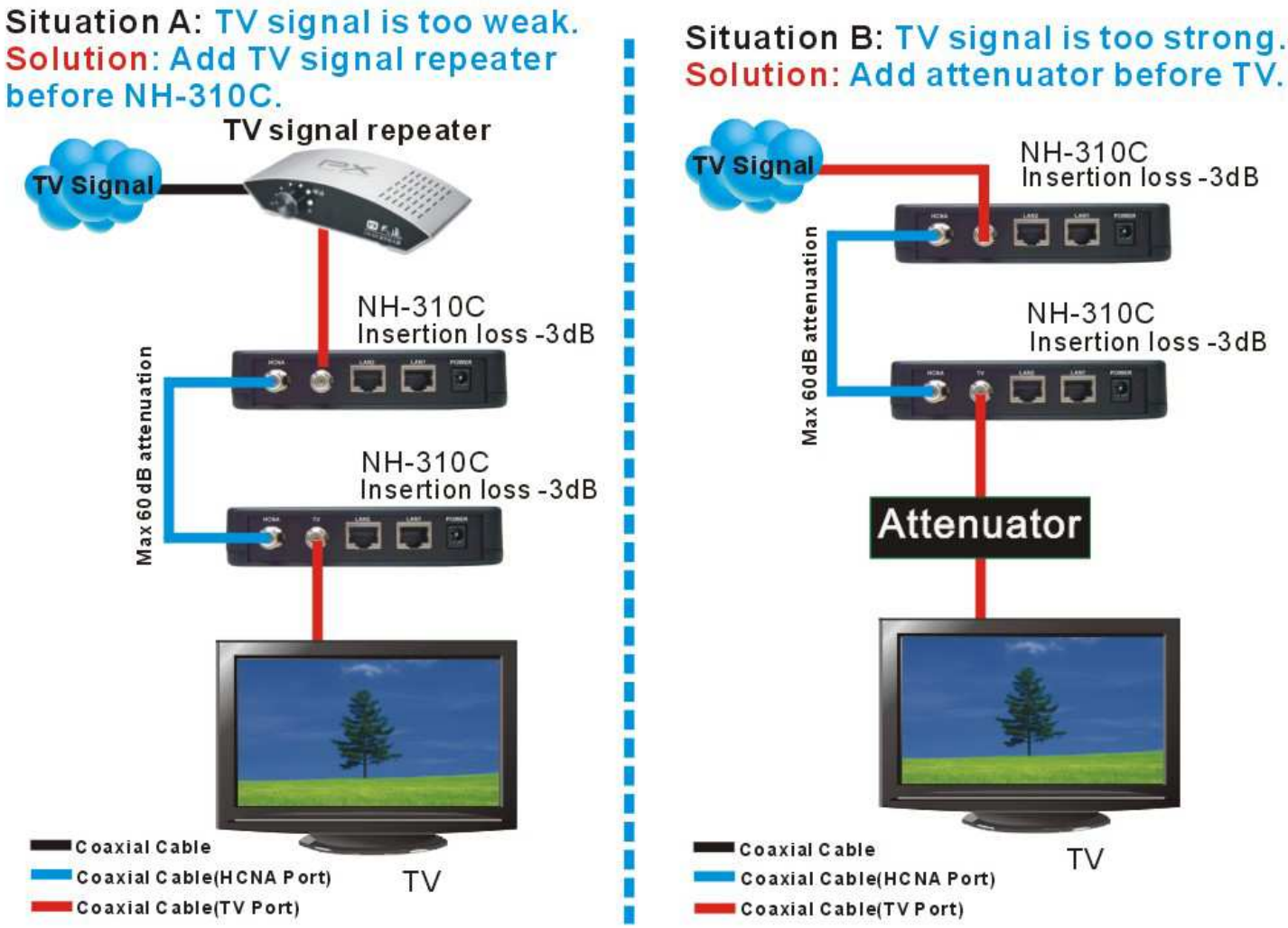


Figure C-1 TV signal connection solution

5. Question:	Why do the NH-310C units have MAC addresses and what are the MAC Addresses used for?
Answer:	Because NH-310C can support 10 endpoints maximum and It uses the MAC address value to identify the identity of each endpoint.

System Diagnostics

Power and Cooling Problems

If the POWER indicator does not turn on when the power cord is plugged in, you may have a problem with the power outlet, power cord, or internal power supply as explained in the previous section. However, if the unit power is off after running for a while, check for loose power connections, power losses or surges at the power outlet, and verify that the fan on back of the unit is unobstructed and running prior to shutdown. If you still cannot isolate the problem, then the internal power supply may be defective. In this case, please contact your local dealer.

Installation

Verify that all system components have been properly installed. If one or more components appear to be malfunctioning (e.g., the power cord or network cabling), test them in an alternate environment where you are sure that all the other components are functioning properly.

Transmission Mode

The default method of selecting the transmission mode for RJ-45 ports is 10/100 Mbps Ethernet, for coaxial connectors are 200Mbps HCNA. It supports auto-negotiation and is **half-duplex**. Therefore, if the link signal is disrupted (e.g. by unplugging the network cable and plugging it back in again, or by resetting the power), the port will try to reestablish communications with the attached device via auto-negotiation. If the device does not support auto-negotiation, communications can be easily lost (i.e., reset to the wrong mode) whenever the attached device is reset or experiences a power fluctuation. The best way to resolve this problem is to upgrade these devices to a version that support Ethernet and 200Mbps HCNA.

Physical Configuration

If problems occur after altering the network configuration, restore the original connections, and try to track the problem down by implementing the new changes, one step at a time. Ensure that cable distances and other physical aspects of the installation that do not exceed recommendations.

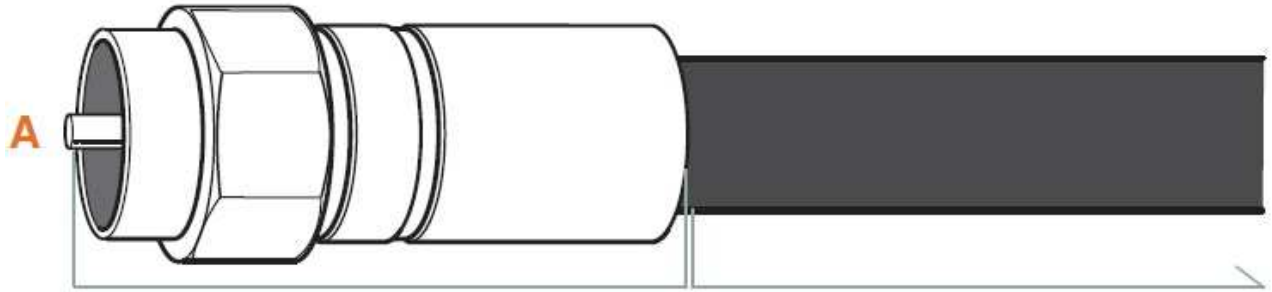
System Integrity

As a last resort verify the switch integrity with a power-on reset. Turn the power to the switch off and then on several times. If the problem still persists and you have completed all the preceding diagnoses, then contact your dealer.

Examples of a Compression F-Connector

CORRECT CONNECTOR CONDITION:

A. Stinger is right length – it protrudes a bit beyond the rim.



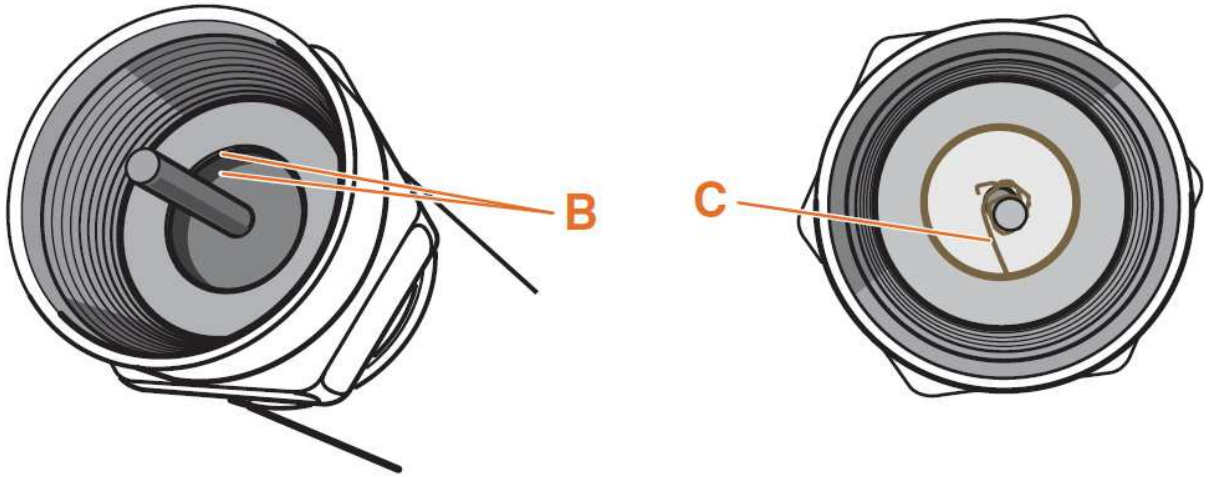
Metal Fittings:
Check for signs of rust or corrosion; replace if necessary

Coax Line:
Visually check visible coax for nicks, splits, and tangling

AVOID THESE BAD CONDITIONS:

B. Low dielectric – a gap between the dielectric and ridge will cause packet loss; dielectric should be flush with the ridge.

C. Debris inside connector – for example, loose shielding strands wrapped around the stinger will cause 30dB attenuation.



Note:

Please note that user need use RG59 75ohm coaxial cable to establish HomePNA network.

Appendix D: FCC and CE Mark Warning

FCC Radio Frequency Interference Statement

This equipment has been tested and found to comply with the limits for a computing device, pursuant to Part 15 of FCC class A rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generate, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

1. Reorient or relocate the receiving antenna.
2. Increase the separation between the equipment and receiver.
3. The equipment and the receiver should be connected to outlets on separate circuits.
4. Consult the dealer or an experienced radio/television technician for help.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

If this telephone equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.
The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the

proper functioning of your equipment. If they do, you will be notified in advance in order for you to make necessary modifications to maintain uninterrupted service.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Important Safety Instructions

- **Caution:** The direct plug-in wall transformer serves as the main product for disconnecting. The socket outlet shall be installed near the product and be readily accessible.
- **Caution:** Use only the power supply included with this product. In the event the power supply is lost or damaged:In the United States, use only with CSA certified or UL listed Class 2 power supply, rated **5-12Vdc 1A** or above.
  IN Europe, use only with CE certified power supply, rated **5-12Vdc 1A** or above.
- **Do not** use this equipment near water, for example in a wet basement.
- **Avoid** using a telephone during an electrical storm. There may be a remote risk of electrical shock from lightning.
- **Do not** use the telephone to report a gas leak in the vicinity of the leaking area.
- If you experience trouble with this unit, please contact customer service of your dealer immediately.
- **DO NOT DISASSEMBLE THIS EQUIPMENT**. It does not contain any user serviceable components.

FCC Warning

This equipment has been tested to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment can generate, use, and radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at owner's expense.

CE Mark Warning

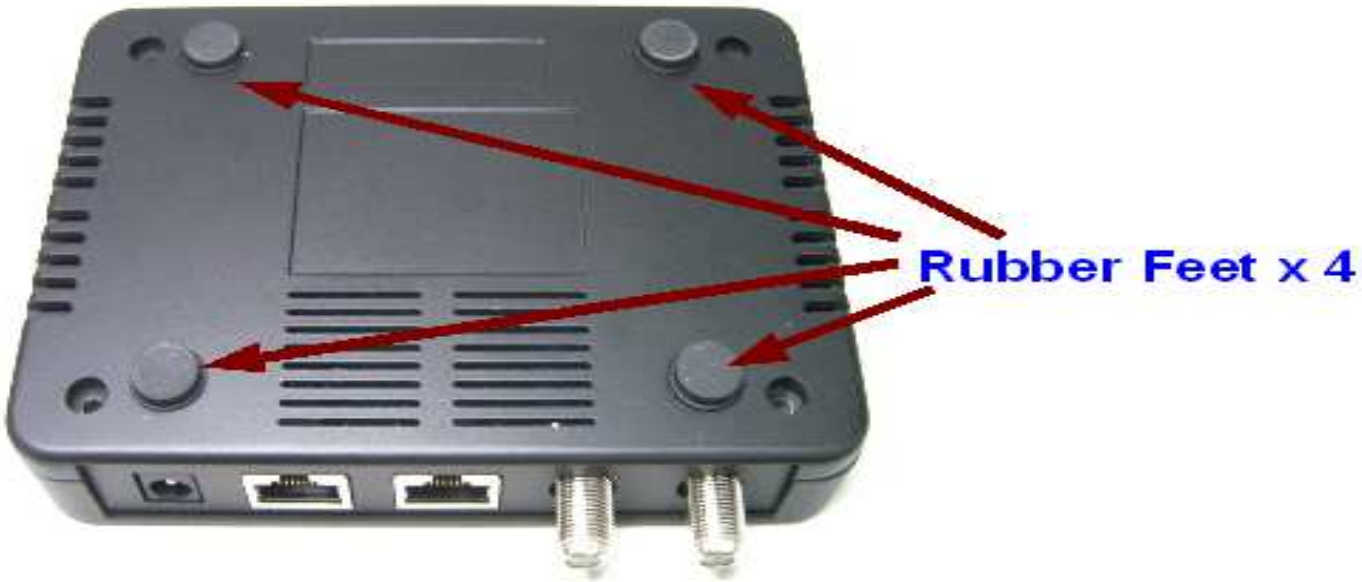
This is a class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

WEEE Warning

To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately.

Appendix E: Attaching Rubber Feet

1. Make sure mounting surface on the bottom of the Modem is grease and dust free.
2. Remove adhesive backing from your Rubber Feet.
3. Apply the Rubber Feet to each corner on the bottom of the Modem. These footpads protect the Modem from shock and vibration.



Warranty

The original owner that the product delivered in this package will be free from defects in material and workmanship for one year parts after purchase.

There will be a minimal charge to replace consumable components, such as fuses, power transformers, and mechanical cooling devices. The warranty will not apply to any products which have been subjected to any misuse, neglect or accidental damage, or which contain defects which are in any way attributable to improper installation or to alteration or repairs made or performed by any person not under control of the original owner.

The above warranty is in lieu of any other warranty, whether express, implied, or statutory, including but not limited to any warranty of merchantability, fitness for a particular purpose, or any warranty arising out of any proposal, specification, or sample. We shall not be liable for incidental or consequential damages. We neither assume nor authorize any person to assume for any other liability.

WARNING:

1. **DO NOT TEAR OFF OR REMOVE THE WARRANTY STICKER AS SHOWN, OR THE WARRANTY IS VOID.**
2. **WARRANTY VOID IF USE COMMERCIAL-GRADE POWER SUPPLY IS USED AT HARSH ENVIRONMENTS.**

Chinese SJ/T 11364-2006

部件名称	有 毒 有 害 物 质 或 元 素					
	铅(Pb)	汞(Hg)	镉(Cd)	六价铬[Cr(VI)]	多溴联苯(PBB)	多溴二苯醚(PBDE)
结构壳体	○	○	○	○	○	○
电路组	○	○	○	○	○	○
电源供应器	○	○	○	○	○	○
线材	○	○	○	○	○	○
包装及配件	○	○	○	○	○	○
○：表示该有毒物质在该部件所有均质材料中的含量均在 SJ/T 11364/2006 标准规定的限量要求以下。 ╳：表示该有毒物质至少在该部件的某依均质材料中的含量超出 SJ/T 11364-2006 标准规定的限量要求。						

上述规范仅适用於中国法律